Infrastructure and Watershed Protection SAG
Meeting Summary
November 18, 1999

Baltimore, Maryland

Opening Remarks

Tom Stevens, NSF pilot manager for the Environmental Technology Verification Source Water Protection pilot (SWP), welcomed all participants to the first meeting of the Infrastructure and Watershed Protection Stakeholder Advisory Group (SAG). Mr. Stevens introduced Ray Frederick, of the EPA Urban Watershed Management Branch in Edison, New Jersey, as the EPA Pilot Manager. Self-introductions were made by all present, including the SAG members, other stakeholders and observers, EPA personnel and NSF personnel. Of the 18 member SAG, 11 members and 2 designated alternates were present. In addition to the SAG, 6 EPA personnel, 3 representatives from NSF International, and 19 other stakeholders and observers were present. A complete list of participants is included in Attachment 1. Copies of overheads presented during the meeting are available upon request.

Mr. Stevens reviewed the goals for the meeting:

- Familiarize stakeholders with the Pilot purpose, structure and function
- Identify and prioritize infrastructure and watershed protection technologies for verification
- Establish the date and location of the next SAG meeting

Overview of the USEPA Environmental Technology Verification Program

Penelope Hansen, Director of EPA's ETV Program, presented the background, history, goals, and principles of the ETV Program administered by the USEPA Office of Research and Development. She explained that the effectiveness of the stakeholder groups involved in this pilot will be critical to the success of the pilot. ETV was founded out of the initial work of several programs in the late 1980s and 1990s that examined the commercialization of innovative technologies. A strategy was developed at the federal level to look into promoting these types of technologies. The need for objective verification of technology performance was demonstrated to be necessary and beneficial to a number of different groups.

The ETV program has a five year pilot period, but Ms. Hansen stressed that it will not automatically end at the five year period, but will continue beyond the pilot period. The extent of EPA participation in the program past the pilot period is not known, but budgets are being developed for years beyond the conclusion date. Ms. Hansen also indicated that sharing of technology information worldwide is needed in all areas, not just for environmental technologies. The work being completed in the ETV program should lead to increased exporting of technologies that have undergone verification.

The immediate goal of the verification program is to provide objective performance data to purchasers and permitters of environmental technologies. Ms. Hansen added that consulting engineers have a very great impact on the commercialization of environmental technologies, and are a significant stakeholder group to be included in the ETV process.

Ms. Hansen stressed that this is a voluntary program and is not related to existing EPA regulations. Verifications do not represent an "approval" by EPA or a Certification by NSF. The program will address only commercial-ready technologies, not those that are still in the research or pilot stage. Technologies that undergo the verification process may have poor performance results, which will be reported. Ms. Hansen indicated that verifications in other pilots have resulted in less than desired results for technologies, which have been published. It is important that vendors do adequate evaluation of their technologies before entering ETV to have confidence of the performance during verification testing.

ETV is a rapidly progressing program, with a very tight time frame. Reports need to be provided to the public within a reasonable time period in order for the verification to be beneficial in getting technologies into the marketplace. If the verification program is truly effective and improves the domestic or international marketability of a technology, the process should be able to move from government to private sector funding. Ms. Hansen explained the major questions to be answered in the 2001 report to Congress:

- Does the environmental marketplace need/value an EPA verification program?
- Is the need different from one technology area to another?
- Can a credible program be designed that the developer community can afford?
- Where is value added from ETV: protocol development? third party verification? EPA verification statement?

Ms. Hansen described the different pilots that have been formed under the ETV program, a total of twelve. Most, although not all, address areas regulated by EPA. The Indoor Air Products pilot is an example of a pilot considering a non-EPA regulated area. Site Characterization and Monitoring is the oldest of the pilots, having started in 1994, with new pilots being added through 1998. The Source Water Protection pilot, along with Wet Weather Flow Technologies and P2 Metal Finishing Technologies, was one of the final pilots to begin. These pilots will still be in operation at the time the report to Congress is submitted. Some of the pilots, such as the P2 Innovative Coatings and Metal Finishing Technologies pilots, have a very technology specific focus, while others such as Source Water Protection have very broad focus. Ms. Hansen described the partner organizations

that were selected to work with EPA on the program, including five private sector testing organizations, one industry association, two Department of Energy national laboratories, and one state government.

Ms. Hansen indicated that the stakeholder groups are unique to the individual technology areas represented by the different pilots. This is the fifteenth stakeholder group to be formed under the ETV program, with about 71 stakeholder meetings having been held to date. She stressed that vendors are important in the verification process, and are encouraged to be active participants and have input at all stages of the process. State representation is also important, with 18 states and 49 individuals being represented in different pilots.

Ms. Hansen explained the purpose of stakeholder groups, in general, and where this stakeholder group is in the stakeholder process. Priorities for the pilot should be set by the stakeholder group in terms of the environmental need, the availability of technologies to be verified, and the level of interest expressed by the vendor community. The pilot will also rely on the stakeholder group to assist in outreach activities, to inform people of what ETV is and is not.

Verification through ETV is not limited to US technologies. There are currently eight vendors from Canada, Denmark, and Germany with ETV verified technologies. International interest in the verification process continues to grow, with interest from a number of international organizations. Included in the list are the United Nations Environment Program (UNEP), the Asian Pacific Economic Cooperation (APEC) Group, NAFTA's Council on Environmental Cooperation, the World Bank and United Nations (for greenhouse gas), the World Health Organization (for water), and the State Department and Agency for International Development.

It was initially thought that there would be a body of available protocols for the partner organizations to select from. Although evaluations of environmental technologies have taken place for many years, there is not a large number of technically sound protocols for verification partners to build on. Subsequently, a significant effort has gone into developing protocols to verify against. The protocols developed by the pilots will be one of the valuable products from the ETV program.

There are four key Verification Program quality criteria that are essential for ETV success:

- *Fairness* - testing will be available to all vendors of commercial ready technologies withing a defined category.
- *Credibility* - verifications will be by an objective third-party testing organization, using preexisting, publicly available protocols or test plans that are capable of generating reproducible results.
- *Transparency* - all results will be made publicly available.
- *Quality* - quality management will be in place and data generated will be of a level acceptable for verification.

Questions raised by the stakeholder group and meeting participants included:

What kinds of organizations have performed the testing? How many have been used to address a particular kind of technology?

Ms. Hansen replied that few of the pilot partners have performed their own testing - most have used other testing organizations. She used the Package Drinking Water Treatment Systems pilot as an example - it currently has seven or eight field testing organizations. She explained that this pilot is considering use of a number of testing organizations, which will facilitate regulatory and user acceptance of the data and would provide for collection of data applicable to a specific region.

How will the success of the program be measured - just in terms of the number of technologies verified, or the widespread use of the technologies aided by the verification?

Ms. Hansen explained that there are follow up surveys to verification participants in order to determine whether the process has been beneficial to them, and, if so, in what ways. Since verifications are the primary focus of the pilot, numbers need to be produced during the startup period for it to be considered successful prior to being able to see any long-term benefits.

Will the program be able to evolve into one where standards are developed for areas that requires it, where regulators and users feel that they need it, even without vendor support?

Ms. Hansen explained that getting the verification information out to the public is what the program is all about. She stressed that if a stakeholder sees a particular need for verification, they need to let the program know that, so that it can be prioritized by the applicable pilot and included in the report to Congress.

Can pilots use or incorporate existing data and protocols into the verification program?

Ms. Hansen indicated that protocols should be able to be used in a pilot, with modifications as needed to meet the program quality goals. She also explained that there are provisions for incorporating pre-existing data into the verification process, but that the requirements are quite stringent, and involve more than the use of EPA methods. To date, there has been no preexisting data that meets the strict requirements of the ETV program.

What is the percent of technology verifications that are currently being funded by the vendor?

Ms. Hansen explained that following the pilot period, the testing element would be paid for by the private vendors, with EPA fiscal responsibility for the stakeholder process, protocol/test plan development, and program outreach. There would also be considerable

support for QA and report review. Currently, she explained, the percentage of vendor funding for verification varies widely from technology to technology and pilot to pilot.

How are technology areas that will be addressed selected?

Ms. Hansen explained that the SAG assists in the prioritization of the technologies, and then makes protocols available for any vendor to apply for verification against (the SWP may operate along additional avenues). John Schenk (NSF) explained the possibility of having phased verifications (therefore, prioritizing technology areas may not have to be done in terms of how long it will take to verify a given one) - performance could be verified over a shorter time period, with O&M characteristics being verified over a longer period of time. This has been done already in the area of greenhouse gases.

Is there was a possibility of verifying treatment trains (and the use of particular technologies in conjunction with each other)?

This has not been done thus far, but could be done in this group, if the stakeholder group considered it to be a worthy challenge. This issue was supported by several members in the group.

Can skills (the way in which people manage environmental aspects) be verified?

Ms. Hansen explained that it will be very difficult to verify operational factors, unless the technologies require only a minimum of human input.

Will maintenance requirements and recommendations will be included in the report?

Some O&M parameters can be recorded over time. Stakeholder review and input into protocols will be critical to ensuring that the appropriate parameters are being considered, including O&M parameters. The cost to collect the data must also be considered, with consideration of whether each parameter to be measured absolutely necessary to the verification, or should other parameters be evaluated first.

Introduction to NSF International

For the benefit of those who were not familiar with NSF International, Tom Stevens discussed the differences between verification and certification, which is one of NSF's core business functions. Both are the same with regard to having standardized test methods, independent performance evaluations and preparation of test results. Differences occur in the broad distribution of test reports (verification does, certification does not), having pass/fail criteria (verification does not, certification does) and in policy issues, including audit of manufacturing facilities, periodic retesting, mandatory review of product changes and use of the NSF Mark (verification does not, certification does). More information is available at the NSF International home page (www.nsf.org)

Wet Weather Flow Technologies Pilot

John Schenk, the NSF pilot manager for the ETV Wet Weather Flow Technologies Pilot, provided the meeting participants with a description of the activities taking place in the pilot. The technology focus of the WWF Pilot to date has been on (1) storm water inlet/control devices (catch basin inserts, self-contained treatment devices, inlet controllers, and source control technologies), (2) advanced high-rate treatment technologies (traditional technologies that have been modified to fit into a smaller footprint - may be done through the addition of chemicals, etc.), including inertial separation/sedimentation technologies, and filtration/screening, (3) disinfection equipment, and (4) biological processes, although biological processes were given a very low priority.

Currently, there is a debate regarding verification of UV disinfection in terms of the hardware, versus in terms of the process. Arguments have been made for and against the different means of verification with respect to disinfection technologies. It would be expensive to verify technologies with respect to both the process and the hardware, so it will be important to take the cost of verification into account in finalizing the test protocol. The other current protocol development efforts include monitoring equipment (flow meters, sensors, and samplers) and computer models.

Potential technology areas for joint WWF and SWP verifications include storm water runoff treatment technologies (filtration/solids removal, and hydrocarbon control and removal) and sewer system rehabilitation technologies. As an example, hydrocarbon control inserts used in service bays for automobile service shops, etc. may also be used to address hydrocarbons in storm water runoff. The protocol for this technology would be similar, regardless of the application, though the challenge water may vary in composition. These two pilots may hold future consecutive meetings in common areas to make it easier for people with overlapping interests to attend both.

Overview of SWP-ETV Pilot

Mr. Stevens presented an overview of the SWP-ETV, including the Pilot structure and objectives. He also outlined the respective roles of NSF International, the Stakeholder Advisory Group and the Technology Panels. The review included a discussion of the July Kick-Off meeting between NSF International and the EPA. During this meeting it was decided that the SWP pilot would extend beyond the original solicitation (i.e. decentralized wastewater treatment) into other areas. This led to the initial formation of a relatively small SAG, selected to incorporate organizations that would have a general interest in source water protection, and with no specific vendor representation. The SAG determined that they would not have the expertise to address broader SWP issues, and a second SAG was formed to address the broader issues. This group is the Infrastructure

and Watershed Protection SAG. Additional information about the Source Water Protection pilot is available upon request, including copies of the overheads used in the presentation.

A question was raised regarding the possibility of performing additional testing that is not specified by the test protocol, but of interest by the vendor to gain additional performance data about their technology. There would be the possibility to include such data as an appendix to the verification report. Since the ETV program is designed to provide the basic information about a technology's performance, payment for such testing would be the responsibility of the vendor. There was also a question raised about testing for environmental parameters that do not directly relate to source water protection, such as odor reduction. In general, if a parameter is identified as important for a source water protection technology, and identified as a measurable parameter in the test protocol, it would be included in the verification testing.

Discussion of Infrastructure and Watershed Protection Issues

Mr. Stevens presented the results of a canvass of the states, which he explained was not a detailed analysis of all needs, but rather a general guide for areas of state concern. Responses were obtained, directly or through Internet access, from 36 states. The top concerns include septic systems, storage tanks, dumps and landfills, animal feed lots, mining operations, agricultural application of pesticides and fertilizers, chemical spills and gasoline stations. The information will provide a basis for further discussion by the SAG in prioritizing technologies on which the pilot should focus.

Presentations were made to describe the work being completed at two universities NSF will be working with during the pilot, in the areas of animal waste treatment and infrastructure rehabilitation. Mr. Stevens explained that memoranda of understanding were being put in place with each university to enable the Source Water Protection pilot to build on the work being done at each. The collaborative effort will leverage funding of the pilot, as well as the universities.

North Carolina State University - Animal Waste Treatment Technologies

Dr. Mike Williams presented information about North Carolina State University's technology evaluation program for animal waste treatment. Their program was established to support research for treating animal waste conversion to a value-added product. There are two programs associated with NCSU: a Six-State Consortium on Animal Waste Management and the Center for Animal and Poultry Waste Management. The CAPWM has evolved into a technology verification process in the evaluation of air (odor abatement) and soil/water technologies. This process is vendor-funded in its entirety. In air, the parameters of concern include N form and transport, odor emissions, and dust emissions. Bioaerosols will also be considered under the air area. In soil/water,

the targeted environmental parameters include: organics, N and P, metals (Cu and Zn), and pathogens (an area of concern added just recently - an emerging issue).

Typical environmental technologies addressing animal waste management are already established, but are being offered as alternatives to traditional lagoon facilities. Originally, the program involved working with the technology manufacturer, who would provide technologies to participating farms, and then NCSU staff and the technology vendors would maintain the systems. They are looking forward to evolving into a more controlled process. Key points of the program include competitive selection of technologies to be evaluated, evaluation for environmental deliverables and economics, and public availability of results, regardless of the technology's performance. Seventeen companies have participated in the program. Examples of evaluated technologies include phosphorus removal using a polymer to precipitate, an upflow biofilter system (Ekokan), a sequencing batch reactor, and an AgStar covered lagoon. NCSU has formed collaborations with several international organizations. Potential technology users are excited by the performance of the technologies, but not by the cost.

Questions were raised regarding the storage of the end products and reuse of the nutrients contained in the waste. The evaluated technologies have primarily been unit processes, but more recent evaluations have been in terms of a systems approach. Since many of the technologies that have been evaluated were developed for municipal systems to reduce contaminants to low levels for discharge, the nutrients contained in the waste are lost for reuse. There was discussion regarding the distribution of nutrients - there are areas that have excess and others that require the addition of nutrients. It was agreed that residuals of agricultural waste treatment will still have to be stored. It was agreed that the key questions in animal waste treatment are: What to do with the water? How to get better distribution of the nutrients?

University of Houston - Infrastructure Rehabilitation Technologies

Dr. Vipulanandan (Vipu) presented information on the work being completed at the University of Houston in the area of sewer system rehabilitation using coatings and grouts. The work addresses the rehabilitation of concrete pipes corroded by sulfuric acid produced by microbiological activities in collection sewers. The program, CIGMAT - Center for Innovative Grouting Materials and Technology, was started in response to a need by the City of Houston's mandate to repair their sewer system.

Manholes, pipe joints, and service connections and the first few feet of the service line are areas where sewer infiltration is most common. Questions have been raised about how grouts will behave when mixed with water - will they mix or will they float? Existing methods used by grout manufacturers to evaluate their products were varied, and a consistent approach was needed. CIGMAT developed protocols for a evaluating coatings, comprised of two phases - the application of the coating and a longer term test to determine the durability of the coating. Application is evaluated under dry and wet conditions to evaluate the bonding ability of the coating. The long term durability of the coating is evaluated by exposure of coating samples to a sulfuric acid solution after

creating defects (holidays) in the coating, since most failures occur at local defects. The full-scale testing period is greater than four months, with control tests lasting more than one year. CIGMAT uses a performance rating system based on the bonding of the coatings to pipe materials, and the extent of damage (blistering of the coating) surrounding the holidays during the exposure test. Other technologies being considered by CIGMAT include corrosion-resistant concretes, cured, in-place pipes, sliplining, and pipe bursting (to enlarge capacity).

The City of Houston provided funding to set up the facilities, and a grant from the National Science Foundation has provided additional funding to the program. The testing completed to date has involved seventeen manufacturers, each of which paid $5,000 for testing.

Identification of Infrastructure and Watershed Protection Technologies

The purpose of this discussion was to identify potential technology areas or specific technologies where verification would be beneficial. This list will provide information in prioritizing the technologies on which the pilot will focus. It was indicated that the list may be enlarged or shortened as the pilot progresses, and that priorities developed from the list could change.

The areas identified by NSF as potential technologies for consideration included:

- animal waste treatment technologies (with N.C. State University)
- infrastructure rehabilitation materials (with University of Houston)
- oil/hydrocarbon removal systems (with the Wet Weather Flow pilot)
- soil stabilization/erosion control
- pipe leak detection (water pipes, oil transmission pipes, etc.)
- non-chemical water conditioning
- precision agriculture (variable rate application of pesticides and fertilizers)
- septage treatment
- spill clean up

Other technologies or technology areas suggested by the SAG and observers included:

- reservoir aeration systems
- algaecides
- street sweepers
- application of agricultural nutrient material
- DNA testing equipment for determining the source of microorganisms in water systems
- no-till systems
- in-situ water treatment techniques for raw water supplies
- genetically engineered crops (to reduce use of pesticides)

- interceptors for solids separation
- sulfur impregnated concrete for sewer systems

It was recognized by the group that there could be any number of other technologies or technology areas that could be included in the list. Discussion followed regarding the best approach to identify the technologies to include in the pilot, keeping in mind that there must be vendors marketing the technology and that the technology has a source water protection impact. Several different ways of breaking out the technologies were discussed, including identifying four or five major areas to group technologies under, breaking agriculture into two areas (livestock and crops), and following subject areas used in source water protection plans (agriculture, urban, hydrologic modification, resource extraction).

It was agreed by meeting participants that separating into two technical advisory groups (agriculture and urban) would be the best approach. It will be the responsibility of the two groups to identify and prioritize technologies under their specific focus area. Meeting participants were asked to express the focus area they are interested in participating on. The groups were:

Agriculture: Mike Williams, Jim Converse, Don Wells, Jim Cox, Dave Neiman, John Classen, Kurt Roos, Dan Williamson, Gary Wegner, Anne Goggin, Michiel Doorn

Urban: Tony Tafuri, Dr. Vipu, Dave Parkhill, Brant Keller, Tom Grizzard, Christopher Crockett, Greg Potter, Rod Frederick, Jay Knight, John Blankenship, Will Kirksey, Rodney Dickerson

These groups will meet separately to further discuss and prioritize technologies. It was agreed that the agriculture advisory group will meet in Raleigh, NC and the urban advisory group will meet in Houston. The dates for the meetings are to be determined.

ATTACHMENT 1
List of Participants for
ETV Source Water Protection Pilot
Infrastructure and Watershed Protection
Stakeholder Advisory Group Meeting
November 18, 1999

Participant	Organization	Classification
Mike Williams *	N.C. State University	University
Jim Converse *	American Society of Agricultural Engineers	Trade Organization University
Dave Neiman *	National Rural Water Association	Trade Organization

Chip McElwee *	Broome County Soil & Water Conservation District	State/regulator
Brant Keller *	American Public Works Association (City of Griffin, GA)	Trade Organization User
Donald Wells *	National Association of Conservation Districts	Trade Organization
Ronald Entringer *	Association of State Drinking Water Administrators (New York State Department of Health)	State/regulator
Jim Cox *	National Association of State Conservation Agencies	Trade Organization
Greg Potter	Mother Environmental Systems, Inc.	Vendor
Jay Knight	Knight Treatment Systems, Kristar Inc.	Vendor
Tom Wheelan	Hanson Pipe & Products, Inc.	Vendor
John Classen	N.C. State University	University
Christopher Crockett *	City of Philadelphia Water Department	State/regulators User
Paula McLelland	Capitol Water Treatment, Inc.	Vendor
Peter Pelling	Wilico	Vendor
Tom Grizzard *	American Water Works Association (Virginia Tech. University)	Trade Organization University
Dan Williamson	In-Pipe Technology Company, LLC	Vendor
Gary Wegner	Natural Aeration Inc.	Vendor
Anne Goggin	Natural Aeration Inc.	Vendor
Andy Rustemeyer	Natural Aeration Inc.	Vendor
John Lafreniere	A.W.T. Environmental	Vendor
David Cone	Green Tech Texas International, Inc.	Vendor
Chuck Chambers	AWTS, Inc.	Vendor
A.L.A. Bryanton	AWTS, Inc.	Vendor
David Parkhill *	American Society of Civil Engineers (Brown & Root Services)	Trade Organization Consultant
C. Vipulanandan *	University of Houston	University
Amit Pramanik	Water Environment Research Foundation	Trade Organization
Sasha Earl	Loomis Austin	Consultant

Dan Davis	Moffa & Associates	Consultant
Michiel Doorn	Arcadis Geraghty & Miller	Consultant
Will Kirksey	Civil Engineering Research Foundation	Other
Kurt Roos	U.S. Environmental Protection Agency	Federal government
Tony Tafuri *	U.S. Environmental Protection Agency	Federal government
Juan Paez	U.S. Environmental Protection Agency	Federal government
Penny Hansen	U.S. Environmental Protection Agency	Federal government
Sarah Bauer	U.S. Environmental Protection Agency	Federal government
Stephanie Barrett	ICF Consulting	Other

*** Indicates Stakeholder Advisory Group members.**